THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATIONS
BCS Level 6 Professional Graduate Diploma in IT

DISTRIBUTED & PARALLEL SYSTEMS

23rd April 2007, 2.30 p.m.-5.30 p.m.
Answer THREE questions out of FIVE. All questions carry equal marks.
Time: THREE hours.

*The marks given in brackets are **indicative** of the weight given to each part of the question.*

Calculators are NOT allowed in this examination.

1. *a)* Explain how may data be *marshalled* prior to transmission in a message. **(5 marks)**

b) What are the requirements for communication and synchronisation between cooperating processes in a distributed system? **(6 marks)**

c) Discuss the protocols required to support:
i) client-server and
ii) group communication. **(14 marks)**

2. *a)* Names are used in a distributed system to refer to a variety of resources. Identify at least THREE different types of name encountered within distributed systems and give examples. **(6 marks)**

b) Outline the main requirements for a name service. **(6 marks)**

c) Compare those issues appropriate to a typical name service that might be designed for a large organization, (such as a university or technical college) and those issues appropriate to a name service designed for a worldwide distributed system (such as DNS or GNS). **(13 marks)**

3. *a)* What do you understand by the term *scalability* in respect to the performance of a parallel computer system. **(4 marks)**

b) Parallel computing can be achieved in a number of ways, either by using specially designed parallel computers or by using a specially configured arrangement of general purpose computers.

Describe ONE example of a specially designed parallel computer and ONE example of a specially configured arrangement of general purpose computers. **(14 marks)**

c) Indicate the environment and problem types best suited for the examples you have chosen in *b)* above and comment on their scalability. **(7 marks)**

4. *a)* Discuss how different parallel programming strategies may be evaluated. **(4 marks)**

b) Assume that, as part of a complex calculation, a sequence of numbers is to be added. Without providing code level detail, briefly describe each of the following three strategies:

i) data-partitioning
ii) recursive divide-and-conquer
iii) pipelining. **(15 marks)**

c) Compare these three strategies, using an appropriate evaluation. **(6 marks)**

5. You have agreed to talk for 30 minutes at the next meeting of your local BCS branch. The title of your talk is:

Comparing Distributed and Parallel Systems: Is there a future for parallel systems?

Sketch out approximately eight presentation slides, with associated notes, that you would use for your talk.

Please note: your answer will be assessed for its quality of approach, accuracy of content, clarity of expression, range of discussion, and depth of argument **(5 marks each)**